

### **REMARKS/ARGUMENTS**

Reconsideration of this application is respectfully requested.

Upon entry of the foregoing amendments, claims 1-18 are pending in the application, with claims 1 and 11 being independent. Claims 1, 3, 4 and 11 are sought to be amended. These changes are believed to add no new matter, and their entry is respectfully requested.

Based on the above amendments and the following remarks, Applicant respectfully requests that the Examiner reconsider all outstanding objections and rejections and that they be withdrawn.

Claims 3 and 4 are amended according to the Examiner's suggestion to remove their respective 35 USC Sec. 112, second paragraph, rejections thereof.

The prior art rejections spanning pages 2-7 of the Office Action are traversed below.

#### **Claims 1 and 11**

Claims 1 and 11 each recite in part a liquid cocktail mixture comprising a neutron absorber "dissolved in water " " with a "liquid scintillator." Exemplary support can be found in paragraph [0012] of the present application. The use of water advantageously results in a non-toxic, minimally caustic and inexpensive liquid cocktail in a neutron detector. Chandross (U.S. pub. pat. appl'n. no. 2003/0226971) does not teach or suggest the features recited in each of claims 1 and 11.

In contrast to both claims 1 and 11, Chandross teaches a "highly metal loaded solution [comprising] an *organic* solution . . . ." For a method of making such a metal loaded solution, Chandross references his copending patent application no. 2002/0188126, filed 5/31/02, entitled "Method of Solvating a Metal in a *Aromatic Organic* Liquid." In both Chandross references, Chandross teaches away from a neutron absorber dissolved in water, as is recited in each of claims 1 and 11.

Claim 1 further recites the liquid cocktail is "housed in a tube having a *mirror* at one end of the tube and a windowed portal at the other end of the tube." The mirror

advantageously amplifies the light guide action of the tube, reflecting photons back toward a detector coupled with the windowed portal end.

The Examiner asserts that Chandross suggests the claimed mirror because the PTFE tube in Chandross is “inherently light reflective” and “the [PTFE in Chandross] is integrally part of the end of the vessel.” Applicant respectfully disagrees on both counts.

First, differing PTFE compositions, including white and transparent compositions, may or may not be considered reflective to different light wavelengths depending on a differential in index of refraction at a boundary between the PTFE and the liquid cocktail. (see paragraph [0020] first sentence, and paragraph [0014] of the present application). Also, PTFE tends to scatter light, not reflect it. Therefore, the PTFE of Chandross is not “inherently light reflective.” In fact, PTFE may be considered inherently non-reflective in certain configurations.

Second, Chandross FIGs. 1 and 2 teach two different vessel configurations, where neither configuration suggests “a mirror at one end of the tube and a windowed portal at the other end,” as recited in claim 1. Referring to Chandross FIG. 1, radiation detector 10 includes a left-side portal to receive light 15 and a right-side photodetector 30 for detecting resulting scintillation light. A “mirror” coincident with photodetector 30 would reflect photons *away* from the detector 10 so as to render detector 10 useless. A mirror coincident with the left-side portal would reflect light 15 *away* from the portal and/or block the light from entering detector 10, thus rendering the portal useless. Thus, the FIG. 1 configuration teaches away from including a “mirror” at either end of detector 10.

Referring to Chandross FIG. 2, each tube 60 ends with opposing photodetectors 70 and 80. A “mirror” at either end of tube 60, coincident with either photodetector, would reflect light away from the photodetector, thus rendering the photodetector useless. Thus, the FIG. 2 configuration, like the FIG. 1 configuration, teaches away from including a “mirror” at either end of the tube.

Each of claims 1 and 11 are patentable over for at least the reasons advanced above.

All of the claims depending from claims 1 and 11 are patentable for at least the same reasons claims 1 and 11 are patentable.

**Claims 2, 9, 10, 12, 17 and 18**

Chandross and Held (U.S. patent no. 3,470,490) alone or in combination do not teach or suggest “a *liquid* cocktail mixture [including] a wavelength shifter,” as recited in claims 2 and 12. Chandross does not teach a wavelength shifter. Held teaches a wavelength shifter made of POPOP in a polyvinyltoluene carrier, which is a *solid*. Held, col. 4, lines 32-42. Thus, Held teaches away from a wavelength shifter in a *liquid*.

The *solid* POPOP wavelength shifter in Held is not “a rare earth chelate,” e.g., of “europium,” as recited in claims 9 and 10, 17 and 18. Held merely teaches a *solid transducer*, such as lithium iodide with europium, which has nothing to do with a wavelength shifter (at col. 4, lines 32-42), let alone a liquid wavelength shifter, as claimed. Held, col. 4, lines 60-66.

**Claims 7, 8, 15 and 16**

Chandross teaches an *organic* solution including only the metal ions of “Ce, Pr, Nd, Pm, Sm, Eu, Th, Dy, Ho, Er, Tm, Lu, In, Gd, Pb, and/or Yb.” Chandross, paragraph [0022]. Therefore, Chandross does not teach or suggest metal ions of Na, and therefore can not be considered to teach or suggest a neutron absorber of NaBF<sub>4</sub> dissolved in water, as recited in each of claims 7 and 15.

Nowhere does Chandross teach or suggest a liquid scintillator component of dipicolinic acid, as recited in each of claims 8 and 16. The teachings of Chandross would not have motivated one of ordinary skill in the art to use dipicolinic acid to make the claimed liquid cocktail.

**Claims 5 and 13**

Chandross teaches an *organic* solution including only the metal ions of “Ce, Pr, Nd, Pm, Sm, Eu, Th, Dy, Ho, Er, Tm, Lu, In, Gd, Pb, and/or Yb.” Chandross, paragraph [0022]. Therefore, Chandross does not teach or suggest metal ions of Li, and therefore

can not be considered to teach a neutron absorber of  $\text{LiBF}_4$  dissolved in water, as recited in each of claims 5 and 13.

Yoshina (U.S. patent no. 4,975,222) teaches a radiation detecting *solid* element including a polyfilm element impregnated with dried  $\text{LiBF}_4$ . Yoshina, col. 7, lines 3-9, and claims 1 and 3. Yoshina fails to cure the deficiencies of Chandross with respect to each of claims 5 and 13, and in fact, teaches away from a neutron absorber of  $\text{LiBF}_4$  dissolved in *water*, as recited in each of claims 5.

#### **Claims 6 and 14**

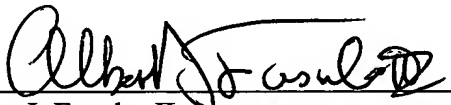
Chandross teaches an *organic* solution including only the metal ions of “Ce, Pr, Nd, Pm, Sm, Eu, Th, Dy, Ho, Er, Tm, Lu, In, Gd, Pb, and/or Yb.” Chandross, paragraph [0022]. Therefore, Chandross does not teach or suggest metal ions of Li, and therefore can not be considered to teach a neutron absorber of  $\text{LiCl}$  dissolved in water, as recited in each of claims 6 and 14.

Maeda (U.S. patent no. 4,620,939) teaches a *solid* scintillation converter made of rubber having added thereto particulate  $\text{LiCl}$ . Maeda, col. 3, lines 7-17 and 38-46. Maeda fails to cure the deficiencies of Chandross with respect to each of claims 6 and 14, and in fact, teaches away from a neutron absorber of  $\text{LiCl}$  dissolved in *water*, as recited in each of claims 6 and 14.

***Conclusion***

On the basis of the above amendments, reconsideration and allowance of this application is believed warranted. If the Examiner believes, for any reason, that personal communication will expedite prosecution, the Examiner is invited to telephone the undersigned at the number provided.

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